to 8h. 0m. I counted fifty meteors. The observer's face was north-west. The sky was clear to within ten or fifteen degrees of the horizon. The meteors were generally very small, and I noticed only four or five near the zenith that left trails behind that endured a few seconds. In one respect the meteors were remarkable: they all appeared to radiate from a point between the great square in Pegasus and the chair in Cassiopeia, so that during my two watches I saw but a single meteor that could properly be called sporadic. By laying down some of the tracks on a globe, I found the following rough position of the radiant point:—

$$\text{A R} = 355^\circ, \quad \text{Decl.} = +43^\circ.$$

From this position of the radiant point I have computed the following elements of the orbit of the meteoric stream, and by the side of these have placed the corresponding number of Biela's comet:—

Meteoric Stream.			Biela's Comet		
π	=	89·5°	π	=	109·0°
Ω	=	246·1	Ω	=	245·9
i	=	15·4	i	=	12·6
$\log q$	=	9·976	$\log q$	=	9·933

These elements are so much alike, that there can be but little doubt that the meteors are the transformed particles of Biela's comet.

ASAPH HALL

Washington, Dec. 1

ON the evening of November 27, Prof. Tingley, of Asbury University, Greencastle, Indiana, observed a remarkable shower of falling stars. The number counted in 40 minutes, from 7h. 15m. to 7h. 55m., was 110. This would give 165 per hour for one observer. But according to Prof. Newton (*Silliman's Journal*, for January 1868, p. 80), the whole number visible at any station, when the sky is entirely clear, is five times the number seen by a single observer. The enumeration by Prof. Tingley accordingly indicates an actual fall of 825 per hour.

It was remarked by the writer several years since* that the last days of November were worthy of close attention as the probable date of a meteoric shower. The same period had been previously designated by Mr. R. P. Greg, as an aërolitic epoch. The observed showers of falling stars which may be referred to this stream are as follows:—

A.D. 837, Nov. 12, cor. to Nov. 27 for 1850.
899, 18, Dec. 2 ,,
1850, 29
1872, 27

The epoch corresponds with that at which the earth crosses the orbit of Biela's comet. This body is no longer visible in its cometary form, having undergone the process of disintegration—a process which doubtless *commenced* at a very remote period. The fact, then, can scarcely be doubted that the meteors of this epoch are the results of this comet's gradual dissolution.

DANIEL KIRKWOOD

Bloomington, Ind., Nov. 28

THE aurora of Nov. 27—the evening of the meteoric display—was seen by me near Liverpool. It appears to have been very partial in its manifestation, to judge by the published accounts. There was merely a hazy or diffused cloudy light, devoid both of colouring and symmetry of form. This variety of aurora I have observed on several occasions, when it appears to have attracted but few observers.

I may draw attention now to the fact of another display of aurora on Nov. 10 (noticed first at about 11.20 P.M.). This was of the usual form, ruddy, and radiating from a horizontal band of light in the north. It was followed by a week of much colder weather than had preceded it.

SAMUEL BARBER

Liverpool, Dec. 13

As the number of meteors which I counted on the evening of Wednesday last, November 27, varied considerably from the number in Mr. Lowe's tables (*Times*, November 29), I beg to offer you my observations, in case they should be of any value on account of the more southern point from which they were taken. I lay down on my back upon the flat roof of the house in which I live, and looked up towards the zenith. The radiating point of most of the meteors seemed to be in the area between Cassiopeia and Perseus. I observed a bright one between the stars representing the feet of Andromeda. It disappeared without traversing almost any visible track or angular distance, from which I drew the inference that it was near the radiating point. The number I counted was as follows:—

Time. h.	m.	No. in 5 minutes.	Average No. per minute.
6	34—39	150	30
6	39—44	140	28
6	45—50	150	30
6	50—55	180	36
7	1— 6	160	32
7	7—12	160	32
7	17—22	170	34
7	30—35	180	36
7	40—45	180	36
8	48—53	150	30
10	5—10	80	16
10	24 29	70	14

Between 8 and 8.30, a friend and I counted together about 50 per minute.

J. F. ANDERSON

Pau, Dec. 2

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* "Meteoric Astronomy," p. 55.

The De Novo Production of Living Things

IN reply to Mr. E. Ray Lankester's inquiry in the last number of NATURE, I beg to state that the specific gravity of an infusion of turnip, prepared in the manner I have directed, was found to be 1012, whilst that of an infusion of hay was 1005.

H. CHARLTON BASTIAN

University College, London, Dec. 16

The Ocean Rainfall

ON reading the article on "The Meteorology of the Future," in NATURE, December 12, I pondered over this passage—"It is impossible to determine the rainfall over the ocean;" and it occurred to me that it is possible to do something in that line approximately. Is the *Challenger* supplied with rain-gauges? Would it not be possible to determine in some measure the hourly amount of rainfall over the ocean, in the zones of greatest precipitation, or in those of periodical rains, without detaining the ship unduly; and would not such data be useful in solving some of the problems connected with the working out of the law of cyclones?

Another suggestion has occurred to me—that is, that rain-gauges might be placed in "floating lights," and the rainfall at sea thus obtained. I need not now inquire through what channel this might be effected, or what particular structure and fixing of the gauges might be necessary. I should be glad to elicit the opinion of some of the readers of NATURE as to the practicability and utility of such a scheme.

S. H. MILLER

Wisbech, Dec. 14.

Ocean Meteorological Observations

AN examination of the discussion of the daily range of the barometer for square No. 3, published under Fitzroy's direction in 1861, which Mr. Symons has referred to at page 68 of this volume, shows that the results there arrived at can only be considered to be good as corrections for hourly observations of the barometer on the mean of the year. As regards the months, the results are, on account of the fewness of the observations on which they are based, too imperfect as indications of the true range to be available in correcting the averages on the large January chart issued by the Meteorological Committee. Since, moreover, the barometric range for January differs from that for the year, the hourly corrections for range on the mean of the year should not be applied to the January observations printed on the large chart.

Again, the prevalence in January of the south-easterly trades in the southern portion of the square, the prevalence of the north-easterly trades in the northern portion, and variable winds between, and the unequally clouded state of the sky which results therefrom, render it certain that range corrections must

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differ considerably in different portions of the square. On these grounds, it would be a mistake, scientifically, to correct the averages of the actual observations on the large chart, in the present state of our knowledge. These should be printed with none except instrumental corrections; and as we have already said, the mean hour of the day and the mean day of the month of each average should be given; for if this be not done, the results of the discussion can be turned to no strict scientific use whatever.

But it is quite otherwise in discussing the data entered on the large chart, with the view of arriving at some knowledge of the distribution of pressure over this important part of the ocean. As we stated before, "such a discussion necessarily calls for a preliminary preparation of the results by the application of such approximate corrections for range as we are in possession of," and of these corrections Fitzroy's, to which Mr. Symons refers, are among the most valuable. To have attempted such a discussion, disregarding the correction for range, is a grave mistake; and we can scarcely suppose the Meteorological Committee will sanction it when they ultimately decide on the method of discussion to be adopted.

Fitzroy recognised the vital importance of range corrections in such discussions; and with this view the monograph above referred to was published under his direction upwards of eleven years ago. It would be well if a series of such monographs were prepared under the direction of the Meteorological Committee, as necessary preliminaries, which indeed they are, to the discussion of the meteorology of each portion of the ocean they undertake to discuss.

YOUR REVIEWER

Rainfall at Barbados

I DO not know whether the following notice is worthy of admission into NATURE, but it suggests many interesting consequences as the effects of heavy rains over continents drained by large rivers.

A very intelligent naturalist, writing to me from Tobago, states:—

"During August we had an influx of fresh water all along our southern coast, and throughout the whole extent the sea eggs crawled ashore, and died in great numbers. No one has seen the like before. I have no doubt the fresh water was the cause of the mortality, and that other shells also suffered."

I have not the means of ascertaining the rainfall of the basins drained by the Orinoco and Amazon, but we in Barbados, and most of the islands in these seas, have been suffering for many months from a protracted drought. Have there been excessive rains on the Continent?

Tobago is at least 150 miles from the mouth of the Orinoco, and 900 miles from that of the Amazon. It is well known that the outflows of both rivers sweep round, and form a swift ocean current impinging on, and passing by, Tobago, whither they carry drift wood, seeds, and other products of the shore. But I never before heard of the quality of the water being affected to so great a distance.

I fear that no person had the curiosity to test the density or quality of the water. I shall inquire of my correspondent.

Barbados, Nov. 11 RAWSON W. RAWSON

Treatise on Probability

THERE has been no doubt as to the author or authors of the "Treatise on Probability," published under the superintendence of the Society for the Diffusion of Useful Knowledge, since 1844. In that year the "Value of Annuities and Reversionary Payments," by David Jones, was issued in two volumes by Robert Baldwin, of 47, Paternoster Row, and the title-page states— "To which is appended a 'Treatise on Probability,' by Sir John William Lubbock, Bart., F.R.S., and J. E. Drinkwater Bethune, Esq., A.M." Sir John Lubbock's name also appears on the opposite page, with his first Christian name properly affixed, and this is repeated at the end of the volume in a catalogue of the works published by that society. The treatise consists of 64 octavo pages, and was one of the best on the subject at the time it was first issued. The late Prof. De Morgan alludes to it in the English Cyclopædia, and Mr. Todhunter quotes "Lubbock and Drinkwater" no fewer than ten times in his "History of Probability," published in 1865.

T. T. WILKINSON

THE HAWAIIAN VOLCANO, MAUNA LOA

THE following condensed account of the visit of a party to the summit of the Hawaiian Volcano, Mauna Loa, at present in a state of fearful activity, appears in the *Times* of November 23, from the pen of Prof. F. L. Clarke.

"From Kaalualu, on the southern side of Hawaii, where we left the steamer on the afternoon of the 4th, we procured horses and proceeded to Wiohinu, where we remained for the night, and started next morning; and, after travelling a distance of twenty-five miles over a very rough road, although it is considered one of the best, we reached Lyman's ranch, where we were kindly received, and passed the night. The following morning, at daylight, our friends having exerted themselves in procuring the services of an experienced guide, we resumed our journey, and after stopping at several ranches for rest and refreshment, during the forenoon of the 6th, we emerged from the woods, which opened upon an immense field of pa-hoe-hoe. The lava fields in this region exceed in wildness and confusion the most extravagant imagination. For miles around, as far as the eye could reach, great masses of once molten lava were tossed into a thousand grotesque shapes. After travelling several hours over the roughest kind of ground imaginable, we reached a rude kind of gateway that was formed by gigantic columns of lava rock, through which we passed, and reached the edge of a rough pali, from whence we were able to look out upon the summit. To our right rose a remarkable pillar, towering high up black against the sky, and on every hand yawned deep crevices and spent lava waves which had dashed together in various shapes and cooled.

"After reaching a favourable spot, where we left our animals secured for the night, we proceeded about 500 yards over a narrow strip of rugged lava, when we suddenly found ourselves upon the edge of the crater of Moku-weo-weo, on the very summit of Mauna Loa, situated about 1,400 feet above the sea level. Before us yawned a fearful chasm, with perpendicular black walls some 800 feet in depth, carrying the eye to where, in the darkness of the lower basin, there sprang up in a gloriously brilliant light a mighty fountain of clear molten lava, and looking across and below us, at a distance probably of three-quarters of a mile, there arose from a cone in the south-west corner of the lower basin a magnificent column of liquid lava, about seventy-five feet in diameter, that sent its volume of molten matter to a height of nearly 200 feet in a compact and powerful jet. The axis of this gigantic fountain inclined somewhat toward us, so that the descending cascade fell clear and distinct from the upward shooting jet, forming a column of continuous liquid metal surpassingly bright and beautiful to gaze upon. Flowing down the sides of the symmetrical cone, which the falling stream of lava was rapidly forming, were numerous rivers of liquid light, that as they flowed away, spreading and crossing, formed a lake of rivulets constantly widening and interlacing, which presented a beautiful and unique appearance.

"When we reached the summit of the mountain, the subdued roar of the pent-up gases was fearfully distinct as they rushed through the openings which their force had rent in the solid bed of the basin, and when we were in full view of the grand display our ears were filled with the mighty sound as of a tremendous surf rolling in upon a level shore, while now and again a mingled crash would remind us of the heavy rush of ponderous waves against the rocky cliffs of Hawaii."

Since the return of the party to Honolulu later advices state that the crater is increasing in action, and reflecting at night a light of unusual brilliancy, which reaches many miles off shore. The crater in Kilanea, since the present eruption of Moku-weo-weo, has been very irregular in its action, which leads to the supposition that the two alternate, that when one is active the other is passive.

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